Researchers' perspectives on Industry 4.0: multi-disciplinary analysis and opportunities for operations management

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Abstract

ABSTRACT While Industry 4.0 has been trending in practice and research, operations management studies in this area remain nascent. Our intent is to understand the current state of research in Industry 4.0 in different disciplines and deduce insights and opportunities for future research in operations management. In this paper, we provide a focused analysis to examine the state-of-the-art research in Industry 4.0. To learn about researchers' perspectives about Industry 4.0, we conducted a large-scale, cross-disciplinary and global survey on Industry 4.0 topics among researchers in industrial engineering, operations management, operations research, control and data science at the 9th IFAC MIM 2019 Conference in Berlin in August 2019. By using our survey findings and literature analysis, we build structural and conceptual frameworks to understand the current state of knowledge and to propose future research opportunities for operations management scholars. Glossary of Abbreviations AGV: Automated guided vehicle; AI: Artificial intelligence; APS: Advanced planning system: a wide variety of software tools and techniques, with many applications in manufacturing and logistics (including the service sector); BDA: Big data analytics; CAS: Complex adaptive system: a system composed of many interacting parts that evolve and adapt over time; CIM: Computer integrated manufacturing; CPFR: Collaborative planning, forecasting and replenishment; CPS: Cyber-physical system: a seamless integration of computation and physical components; DAMCLS: Decision analysis, modelling, control and learning systems; ERP: Enterprise resource planning; FMS: Flexible manufacturing system; I4.0: Industry 4.0; IFAC: International Federation of Automatic Control: a federation is concerned with the impact of control technology on society; IME: Industrial and mechanical engineering; IoT: Internet-of-Things; IT: Information technology; M2M: Machine-to-machine; MAS: Multi-agent system: a loosely coupled network of software agents that interact to solve problems that are beyond the individual capacities or knowledge of each problem solver; OR: Operations research; RFID: Radio frequency identification: a technology that uses electromagnetic fields to automatically identify and track tags attached to objects; RMS: Reconfigurable manufacturing system: a manufacturing system that can change and evolve rapidly in order to adjust its productivity capacity and functionality; OM: Operations management; T&T: Track and trace system; VCA: VOS viewer co-occurrence analysis: a software tool for visualising bibliometric networks; VMI: Vendor-managed inventory.